**3GPP TSG-SA5 Meeting #145-e *S5-225258***

e-meeting, 15 - 24 August 2022

**Source: Huawei, Deutsche Telekom**

**Title: New Key Issue-RAN energy saving when using backup batteries**

**Document for: Approval**

**Agenda Item: 6.9.2.2**

# 1 Decision/action requested

**Include the proposed changes in TR 28.913**

# 2 References

[1] 3GPP TR 28.913: "Study on new aspects of EE for 5G networks phase 2"

[2] SP-211440: "New Study on new aspects of EE for 5G networks Phase 2"

# 3 Rationale

In SP-211440 [2], the third objective (“• On energy saving”) includes the following sub-objective: “o Study new use cases, requirements and solutions for energy saving, applying to NG-RAN …”.

This pCR proposes to introduce a new Key Issue ‘RAN energy saving when using backup battery’ into TR 28.913 [1].

# 4 Detailed proposal

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| **First change** |

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 28.554: " Management and orchestration; 5G end to end Key Performance Indicators (KPI)".

[3] ETSI GS NFV-IFA 027 V4.2.2 (2021-07): "Network Functions Virtualisation (NFV) Release 4; Management and Orchestration; Performance Measurements Specification".

[4] ETSI ES 202 336-12 V1.2.1 (2019-02): "Environmental Engineering (EE); Monitoring and control interface for infrastructure equipment (power, cooling and building environment systems used in telecommunication networks); Part 12: ICT equipment power, energy and environmental parameters monitoring information model".

[5] ETSI GS NFV-EVE 004 V1.1.1 (2016-03): "Network Functions Virtualisation (NFV); Virtualisation Technologies; Report on the application of Different Virtualisation Technologies in the NFV Framework".

[6] ETSI GR NFV-IFA 029 V3.3.1 (2019-11): "Network Functions Virtualisation (NFV) Release 3; Architecture; Report on the Enhancements of the NFV architecture towards "Cloud-native" and "PaaS"".

[7] 3GPP TS 38.300: "NR; NR and NG-RAN Overall Description; Stage 2".

[8] 3GPP TS 38.401: "NG-RAN; Architecture description".

[9] The Greenhouse Gas Protocol - <https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>

[X] 3GPP TS 32.551: “Telecommunication management; Energy Saving Management (ESM); Concepts and requirements”

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| **Next change** |

## 4.X Key Issue #X: RAN energy saving when using backup batteries

### 4.X.1 Description

When RAN faces main power failure, it is supported by backup batteries to prolong the service. However, due to cost and deployment space considerations, batteries may have insufficient lifespan. As a result, the period of service time supported by backup batteries may not meet demand, but may be extended by RAN energy saving actions.

RAN energy saving achieved by executing energy saving actions is especially crucial when using backup batteries, and satisfy the following requirements:

# backup requirement: the period of time batteries can provide service needs to be maximized, which needs the help of RAN energy saving;

# QoS requirement: the influence on QoS should also be considered when taking energy saving actions.

For example, to maximize the duration the service can be offered when using backup batteries, QoS may have to be degraded. Conversely, to continue servicing users with the same QoS when using batteries, there is a risk that service is interrupted.

Hence, when using backup batteries, it is much important to manage energy saving actions to balance the backup requirement and the QoS requirement.

### 4.X.2 Potential solutions

#### 4.X.2.i Potential solution #<1>: < Activation of Energy Saving functions based on battery capacity level and location >

##### 4.X.2.i.1 Introduction

This key issue is to study potential solutions for extending battery lifetime for the cells having main power failure to continue providing service to the customer.

• Pre-condition #1: RAN system has the information about battery lifetime.

• Pre-condition #2: Cell has its own RAN energy saving features available to conserve battery power.

##### 4.X.2.i.2 Description

ES compensation described in TS 32.551 [X] and compensating for energy saving state can be used when capacity cells are running on backup batteries based on the battery backup time. Cells running on the battery backup and located near border of the load shading zone can enter into ES state and change its configuration to remain powered on. Cells surrounding the load shading area can enter into compensatingForEnergySaving state and taking over the coverage areas of neighbour cell in energy Saving state.

Cells which are located inside of the load shading area and has no neighbour cells running on main power can extend battery backup time by applying different RAN features is steps. For example when the cell is running on battery capacity between 80% & 50% of its lifetime it can activate for example MIMO sleep mode, if the capacity goes down below 20% it can trigger cell sleep mode so that traffic can be handed over to neighbour cells without interruption. Continuation of the service thus can be ensured compromising the QoS. It can trigger more restrictive energy saving mode to prolong the service.

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| **End of changes** |